

CLAIMS

Having thus described the invention, what is claimed is:

1. A combination seed capsule, comprising:

- (a) at least one viable seed, having an outer surface and acting as a core or psuedo-core of said combination seed capsule; and
- (b) a coating of a composition comprising a soil conditioning material mounted proximate, including disposed outwardly of the outer surface of said seed.

2. A combination seed capsule as in Claim 1, said coating providing at least one of

- (i) enhancing broadcast flight properties of said combination seed capsule;
- (ii) reducing susceptibility to deleterious affects of weather on said combination seed capsule;
- (iii) enhancing resistance of said combination seed capsule to attack by animals or spore-formers;
- (iv) staged germination of ones of said seed capsules, having seeds, under a given set of conditions, over a period of time longer than the range of germination times inherent in said seeds;

- (v) enhancing control of moisture about said seed thereby to assist in seed germination;
- (vi) release of plant nutrients into soil onto which said combination seed capsule is placed;
- (vii) soil conditioning effect to soil onto which said combination seed capsule is placed;
- (viii) staged release of plant nutrients into soil onto which said combination seed capsule is placed, over a period of time longer than the range of times inherent in the chemical composition so released;
- (ix) higher embryo emergence and survival rate in a population of said seed capsules, thereby reducing required seed planting density for a desired plant population density; and
- (x) assisting in stabilizing moisture content in soil on which such seed capsule is disposed.

3. A combination seed capsule as in Claim 1 wherein said seed is selected from the group consisting of grass, vegetables, grains, and flowers.

4. A combination seed capsule as in Claim 1, said coating further comprising said soil conditioning material in combination with at least one ingredient effective to reduce susceptibility of

said seed capsule to deleterious affect of at least one of animals, weeds, and spore-formers.

5. A combination seed capsule as in Claim 4 wherein said at least one ingredient to reduce susceptibility of the seed capsule is selected from the group consisting of herbicides, fungicides, and a bitter substance.

6. A combination seed capsule as in Claim 5 wherein said fungicide comprises metalaxyl.

7. A combination seed capsule as in Claim 1, said coating comprising a first coating, said combination seed capsule further comprising a second coating, separate from said first coating, and comprising at least one ingredient effective to reduce susceptibility of said seed capsule to deleterious effect of at least one of animals, weeds, and spore-formers.

8. A combination seed capsule as in Claim 1, effective to provide a plant nutrient at a desirable controlled distance from a plant seedling emerging from said seed, in an amount beneficial to said plant seedling.

9. A combination seed capsule as in Claim 1, said coating comprising a first coating, said combination seed capsule further comprising a second coating of a second coating material intermingled with said first coating material in an outer portion of said first coating, and generally displaced from said seed.

10. A combination seed capsule as in Claim 9 wherein said second coating material comprises a plant nutrient, beneficial in location and in amount of availability, to plant seedling emerging from said seed.

11. A combination seed capsule as in Claim 9 wherein said second coating composition comprises an inorganic form of a plant nutrient and is selected from the group consisting of nitrogen, phosphorus, and potassium.

12. A combination seed capsule as in Claim 9 wherein said second coating composition comprises an inorganic form of a plant nutrient and is selected from the group consisting of urea, monammonium phosphate, diammonium phosphate, superphosphate, triple superphosphate, dicalcium phosphate, and potash.

13. A combination seed capsule as in Claim 9 wherein said second coating composition comprises an inorganic form of a plant nutrient is selected from the group consisting of sulfur, manganese, copper, boron, iron, magnesium and chromium.

14. A population of combination seed capsules of Claim 1, said population of seed capsules comprising coatings having a range of properties affecting germination rate of said seeds, thereby to stage germination of said seeds in said population over a period of time longer than the range of germination times inherent in uncoated ones of said seeds.

15. A population of combination seed capsules as in Claim 14 wherein said range of properties comprises at least one of (i) a range of hardnesses and (ii) a range of thicknesses, of said coatings.

16. A combination seed capsule as in Claim 1, said coating comprising a first layer of said soil conditioning material, and including a second layer comprising an inorganic fertilizer.

17. A combination seed capsule as in Claim 1, said coating comprising a first layer of said soil conditioning material, and including a second layer comprising at least one micronutrient.

18. A combination seed capsule as in Claim 17 wherein said micronutrient is selected from the group consisting of sulfur, manganese, copper, boron, iron, magnesium and chromium.

19. A combination seed capsule as in Claim 1, said soil conditioning material comprising a sludge composition.

20. A combination seed capsule as in Claim 1, said soil conditioning material comprising a fiber-containing by-product of a paper making operation.

21. A combination seed capsule as in Claim 1, said seed capsule comprising a water-leachable plant nutrient, and a leach-

retardant composition effective to retard leaching of said leachable plant nutrient out of said combination seed capsule.

22. A population of combination seed capsules of Claim 1, said coating in ones, but less than all, of said population, comprising an ingredient effective to retard effective penetration of a seed-germinating environment to said seed for germination thereof.

23. A combination seed capsule as in Claim 1, said seed capsule comprising an inner layer on the outer surface of said seed, and an outer layer, said inner layer enhancing properties of said seed for acting as nucleus in an agglomeration operation agglomerating said coating onto said inner layer.

24. A combination seed capsule as in Claim 1 wherein said coating comprises an admixture of said soil conditioner and a plant nutrient.

25. A combination seed capsule as in Claim 1 wherein said coating remains generally disposed about said seed until said seed germinates.

26. A plant growing system, comprising:

- (a) a plant growing medium extending over an area, said plant growing medium having a root zone, and a top surface of said root zone generally corresponding with a top surface

of said plant growing medium, said plant growing medium having a first overall soil condition and texture; and

- (b) a population of seed capsules disposed over the top surface of said plant growing medium, said seed capsules comprising individual seeds, having outer surfaces, and coatings of soil conditioning material disposed outwardly of the outer surfaces of said seeds,

said coatings of said seed capsules providing localized germination and growth environments, at and adjacent said seeds, having texture, and nutrient and water holding properties for supporting seedling health, superior to respective said properties as provided overall in the root zone of said plant growing medium.

27. A growing system as in Claim 26, said coatings remaining generally disposed about said seeds until respective ones of said seeds germinate.

28. A growing system as in Claim 26, said coatings providing at least one of

- (i) enhancing broadcast flight properties of said combination seed capsule;
- (ii) reducing susceptibility to deleterious affects of weather on said combination seed capsule;
- (iii) enhancing resistance of said combination seed capsule to attack by animals or spore-formers;

- (iv) staged germination of ones of said seed capsules, having seeds, under a given set of conditions, over a period of time longer than the range of germination times inherent in said seeds;
- (v) enhancing control of moisture about said seed thereby to assist in seed germination;
- (vi) release of plant nutrients into soil onto which said combination seed capsule is placed;
- (vii) soil conditioning effect to soil onto which said combination seed capsule is placed;
- (viii) staged release of plant nutrients into soil onto which said combination seed capsule is placed, over a period of time longer than the range of times inherent in the chemical composition so released;
- (ix) higher embryo emergence and survival rate in a population of said seed capsules, thereby reducing required seed planting density for a desired plant population density; and
- (x) assisting in stabilizing moisture content in soil on which such seed capsule is disposed.

29. A growing system as in Claim 26 wherein said seeds are selected from the group consisting of grass, vegetables, grains, and flowers.



30. A growing system as in Claim 26, said coatings further comprising said soil conditioning material in combination with at least one ingredient effective to reduce susceptibility of said seed capsules to deleterious affect of at least one of animals, weeds, and spore-formers.

31. A growing system as in Claim 26, said coating comprising a first coating, said combination seed capsules further comprising a second coating, separate from said first coating, and comprising at least one ingredient effective to reduce susceptibility of said seed capsules to deleterious effect of at least one of animals, weeds, and spore-formers.

32. A growing system as in Claim 26, effective to provide plant nutrients at desirable controlled distances from plant seedlings emerging from said seeds, in amounts beneficial to said plant seedlings.

33. A growing system as in Claim 26, said coatings comprising first coatings, said combination seed capsules further comprising second coatings of second coating materials intermingled with said first coating materials in outer portions of said first coatings, and generally displaced from said seeds.

34. A growing system as in Claim 33 wherein said second coating materials comprise plant nutrients, beneficial in location and in amount of availability, to plant seedlings emerging from said seeds.

35. A growing system as in Claim 26, said population of seed capsules comprising coatings having a range of properties affecting germination rates of said seeds, thereby to stage germination of said seeds in said population over a period of time longer than the range of germination times inherent in uncoated ones of said seeds.

36. A growing system as in Claim 26, said coatings comprising first layers of said soil conditioning material, and including second layers comprising inorganic fertilizer.

37. A growing system as in Claim 26, said soil conditioning material comprising a sludge composition.

38. A growing system as in Claim 26, said soil conditioning material comprising a fiber-containing by-product of a paper making operation.

39. A growing system as in Claim 26, said seed capsules comprising inner layers on the outer surfaces of said seeds, said inner layers enhancing properties of said seeds for acting as nucleus in an agglomeration operation agglomerating said coatings onto said inner layers.

40. A growing system as in Claim 26 wherein said coatings comprise admixtures of said soil conditioner and plant nutrient.

41. A method of providing plant micronutrients to soil, the method comprising placing onto the soil a population of combination seed capsules, each comprising at least one seed, and a coating comprising a plant micronutrient material.

42. A method as in Claim 41, the coating comprising a first coating comprising the plant micronutrient, and a second coating, separate and distinct from the first coating, and comprising a soil conditioning material.

43. A method as in Claim 41, the coating providing at least one of

- (i) enhancing broadcast flight properties of said combination seed capsule;
- (ii) reducing susceptibility to deleterious affects of weather on said combination seed capsule;
- (iii) enhancing resistance of said combination seed capsule to attack by animals or spore-formers;
- (iv) staged germination of ones of said seed capsules, having seeds, under a given set of conditions, over a period of time longer than the range of germination times inherent in said seeds;
- (v) enhancing control of moisture about said seed thereby to assist in seed germination;
- (vi) release of plant nutrients into soil onto which said combination seed capsule is placed;

- (vii) soil conditioning effect to soil onto which said combination seed capsule is placed;
- (viii) staged release of plant nutrients into soil onto which said combination seed capsule is placed, over a period of time longer than the range of times inherent in the chemical composition so released;
- (ix) higher embryo emergence and survival rate in a population of said seed capsules, thereby reducing required seed planting density for a desired plant population density; and
- (x) assisting in stabilizing moisture content in soil on which such seed capsule is disposed.

44. A method as in Claim 41, the coating providing a plant nutrient at a desirable controlled distance from a plant seedling emerging from the seed, in an amount beneficial to the plant seedling.

45. A method as in Claim 41, the coating comprising a first coating, the combination seed capsule further comprising a second coating of a second coating material intermingled with the first coating material in an outer portion of the first coating, and generally displaced from the seed.

46. A method as in Claim 45 wherein the first coating comprises plant micronutrient material and the second coating

comprises plant nutrient material comprising at least one of nitrogen, phosphorus, and potassium.

47. A method as in Claim 41 wherein the micronutrient composition comprises a plant nutrient selected from the group consisting of sulfur, manganese, copper, boron, iron, magnesium and chromium.

48. A method as in Claim 41, the coating comprising a first layer of the soil conditioning material, and including a second layer comprising an inorganic fertilizer.

49. A method as in Claim 41, the coating comprising a sludge composition.

50. A method as in Claim 41, the coating comprising a fiber-containing by-product of a paper making operation.

51. A method as in Claim 41, the seed capsule comprising an inner layer on an outer surface of the seed, and an outer layer, the inner layer enhancing properties of the seed for acting as nucleus in an agglomeration operation agglomerating the coating onto the inner layer.

52. A method as in Claim 41 wherein the coating comprising an admixture of soil conditioner and a plant nutrient.

53. A method as in Claim 41 wherein the coating remains generally disposed about the seed until the seed germinates.

54. A method of providing a seed bed having enhanced growing conditions for growing seed, the method comprising:

- (a) coating a population of the seeds with material, and thereby providing coatings thereon of such material, tending to stabilize, in the seed capsules, or in soil on which the seed capsules are disposed coating compositions which tend to hold, moisture adjacent the seeds in the seed capsules or in soil adjacent the seed capsules, in such quantities and for such times as to enhance growing conditions for the seeds; and
- (b) placing the population of seeds on soil effective to support germination of the seeds which are in the seed capsules.

55. A method as in Claim 54, the coatings providing at least one of

- (i) enhancing broadcast flight properties of said combination seed capsule;
- (ii) reducing susceptibility to deleterious affects of weather on said combination seed capsule;
- (iii) enhancing resistance of said combination seed capsule to attack by animals or spore-formers;

- (iv) staged germination of ones of said seed capsules, having seeds, under a given set of conditions, over a period of time longer than the range of germination times inherent in said seeds;
- (v) release of plant nutrients into soil onto which said combination seed capsule is placed;
- (vi) soil conditioning effect to soil onto which said combination seed capsule is placed;
- (vii) staged release of plant nutrients into soil onto which said combination seed capsule is placed, over a period of time longer than the range of times inherent in the chemical composition so released; and
- (viii) higher embryo emergence and survival rate in a population of said seed capsules, thereby reducing required seed planting density for a desired plant population density.

56. A method as in Claim 54 wherein the seeds are selected from the group consisting of grass, vegetables, grains, and flowers.

57. A method as in Claim 54, effective to provide a plant nutrient at desirable controlled distances from plant seedlings emerging from the seeds, in amounts beneficial to the plant seedlings.

58. A method as in Claim 54, the coatings comprising first coatings, the combination seed capsules further comprising second coatings of second coating materials intermingled with the first coating materials in outer portions of the first coatings, and generally displaced from the seeds.

59. A method as in Claim 58 wherein the second coating materials comprise plant nutrients, beneficial in location and in amount of availability, to plant seedlings emerging from the seeds.

60. A method as in Claim 58 wherein the second coating compositions comprise inorganic forms of plant nutrients and are selected from the group consisting of nitrogen, phosphorus, and potassium.

61. A method as in Claim 54, the population of seed capsules comprising coatings having a range of properties affecting germination rate of the seeds, thereby to stage germination of the seeds in the population over a period of time longer than the range of germination times inherent in uncoated ones of the seeds.

62. A method as in Claim 54, the coatings comprising first layers of the soil conditioning material, and including second layers comprising inorganic fertilizer.

63. A method as in Claim 54, the coatings comprising first layers of the soil conditioning materials, and including second layers comprising micronutrients.



64. A method as in Claim 54, the soil conditioning materials comprising sludge compositions.

65. A method as in Claim 54, the soil conditioning materials comprising fiber-containing by-products of paper making.

66. A method as in Claim 54, the seed capsules comprising water-leachable plant nutrients, and leach-retardant compositions effective to retard leaching of the leachable plant nutrients out of the combination seed capsules.

67. A method as in Claim 54, the seed capsules comprising inner layers on the outer surfaces of the seeds, and outer layers, the inner layers enhancing properties of the seeds for acting as nuclei in agglomeration operations agglomerating the coatings onto the inner layers.

68. A method as in Claim 54 wherein the coatings comprise admixtures of the soil conditioners and plant nutrients.

69. A method as in Claim 54 wherein the coatings remain generally disposed about the seeds until the seeds germinate.

70. A method of making a population of combination seed capsules, each comprising a seed, and a coating of a soil conditioning material, the method comprising:

- (a) pre-coating the seed with a material which enhances the ability of the seed to act as a nucleus in an agglomeration operation, to form a pre-coated substrate; and
- (b) subsequently coating the pre-coated substrate with a soil conditioning material.

71. A method as in Claim 70 wherein the pre-coating material comprises dicalcium phosphate.

72. A method as in Claim 70 wherein the pre-coating step results in an overall increase in the density of pre-coated seed combination.

73. A method as in Claim 70 wherein the pre-coating is accomplished by spraying the pre-coating material onto the seed.

74. A method of providing an enhanced seed germination environment in combination with placement of a controlled amount of plant nutrients in controlled proximity to each seed, the method comprising:

- (a) providing a population of seeds, coated with a soil conditioning material which tends to enhance germination of the seeds, and with plant nutrient composition effective to enhance growth of plant embryos emerging from the seeds; and

- (b) placing the population of seeds on soil effective to support germination of the seeds.

75. A method as in Claim 74 wherein the coating material includes therein a second ingredient comprising plant nutrient moieties.

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